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Also admitted in Massachusetts

February 21, 2014

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Facility Modification
88 Main Street, Monroe, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the 165-foot level of the existing 195-foot tower at 88 Main Street in Monroe, Connecticut (the “Property”). The tower is owned by Crown Castle. The Council approved Cellco’s use of the existing tower in 2003. Cellco now intends to modify its facility by adding three (3) model 742 213V01, 2100 MHz antennas, for a total of fifteen (15) antennas, all at the same 165-foot level on the tower. Cellco also intends to install three (3) remote radio heads (“RRHs”) behind its 2100 MHz antennas; six (6) new coaxial cables inside the monopole; and one (1) HYBRIFLEX™ antenna cable attached to the outside of the monopole. All new cables will be attached to the outside of the monopole. Included in Attachment 1 are specifications for Cellco’s replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Steve Vavrek, First Selectman of the Town of Monroe. A copy of this letter is also being sent to Stepney Volunteer Fire Department, the owner of the Property.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).



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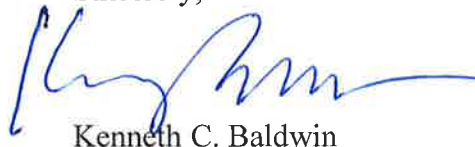
ROBINSON & COLE_{LLP}

Melanie A. Bachman
February 21, 2014
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1. The proposed modifications will not result in an increase in the height of the existing tower. The new antennas and RRHs will be located at the 165-foot level on the 195-foot tower.
2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative worst-case RF emissions calculation for Cellco's modified facility is included in Attachment 2.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The tower and its foundation can support Cellco's proposed modifications. (See Structural Analysis Report included in Attachment 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,



Kenneth C. Baldwin

Enclosures
Copy to:

Steve Vavrek, Monroe First Selectman
Stepney Volunteer Fire Department
Sandy M. Carter



ATTACHMENT 1

KATHREIN SCALA DIVISION

742 213V01

65° Panel Antenna

Kathrein's X-polarized adjustable electrical downtilt antennas offer the wireless carrier the ability to tailor polarization diversity sites for optimum performance. Using variable downtilt, only a few models need be procured to accommodate the needs of widely varying conditions. Remotely controlled downtilt is available as a retrofitable option.

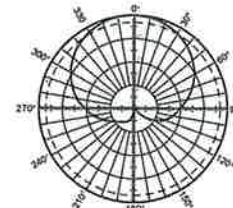
- 0-6° downtilt range.
- UV resistant pulltruded fiberglass radome.
- DC Grounded metallic parts for impulse suppression.
- No moving electrical connections.
- Wideband vector dipole technology.
- Optional remote downtilt Control.
- Will accommodate future 3G / UMTS applications.

General specifications:

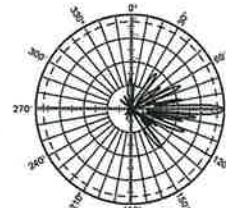
Frequency range	1710–2200 MHz	
VSWR	< 1.5:1	
Impedance	50 ohms	
Intermodulation (2x20w)	IM3: <-150 dBc	
Polarization	+45° and -45°	
Front-to-back ratio (180°±30°)	>30 dB (co-polar) >25 dB (total power)	
Maximum input power	300 watts per input (at 50°C)	
Electrical downtilt continuously adjustable	0–6 degrees	
Connector	2 x 7-16 DIN female	
Isolation	>30 dB	
Cross polar ratio		
Main direction 0°	25 dB (typical)	
Sector ±60°	>10 dB	
Tracking, average	0.5 dB	
Squint	±2.0°	
Weight	19.8 lb (9 kg) 24.3 lb (11 kg) clamps included	
Dimensions	76.9 x 6.1 x 2.8 inches (1954 x 155 x 70 mm)	
Wind load	at 93 mph (150kph)	
Front/Side/Rear	115 lbf / 32 lbf / 115 lbf (510 N) / (140 N) / (510 N)	
Mounting category	M (Medium)	
Wind survival rating*	120 mph (200 kph)	
Shipping dimensions	88 x 6.8 x 3.6 inches (2235 x 172 x 92 mm)	
Shipping weight	28.7 lb (13 kg)	
Mounting	Fixed mounts for 2 to 4.6 inch (50 to 115 mm) OD masts are included and tilt options are available.	

See reverse for order information.

Specifications:	1710–1880 MHz	1850–1990 MHz	1920–2200 MHz
Gain	19 dBi	19.2 dBi	19.5 dBi
+45° and -45° polarization horizontal beamwidth	67° (half-power)	65° (half-power)	63° (half-power)
+45° and -45° polarization vertical beamwidth	4.7° (half-power)	4.5° (half-power)	4.3° (half-power)
Sidelobe suppression for first sidelobe above main beam	0° 2° 4° 6° T 18 18 16 15 dB	0° 2° 4° 6° T 18 18 17 16 dB	0° 2° 4° 6° T 18 18 18 18 dB



Horizontal pattern
±45° polarization



Vertical pattern
±45° polarization
0°–6° electrical downtilt



11271-B
936.3740/b



*Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



A distributed eNodeB expands deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-AWS is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low

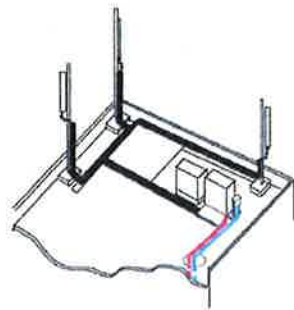
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-AWS is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-AWS is compact and weighs less than 20 kg (44 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

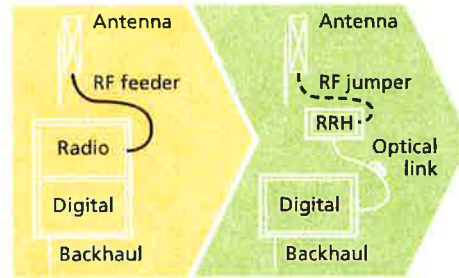
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced. The Alcatel-Lucent RRH2x40-AWS provides more RF power while at the same time consuming less electricity.



Macro

Features

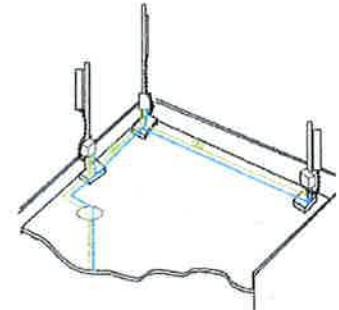
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption



RRH for space-constrained cell sites

Benefits

- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170mm (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
 - With solar load: -40°C to +50°C (-40°F to +122°F)
 - Without solar load: -40°C to +55°C (-40°F to +131°F)

- Passive convection cooling (no fans)
- Enclosure protection
 - IP65 (International Protection rating)

RF characteristics

- Frequency band: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
 - TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
 - One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
 - Single mode dual fiber (SM/DF)
- Multi-mode variant
 - Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

Digital Ports and Alarms

- Two optical ports to support daisy-chaining
- Six external alarms

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HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Features/Benefits

- Aluminum corrugated armor with outstanding bending characteristics - minimizes installation time and enables mechanical protection and shielding
- Same accessories as 1 5/8" coaxial cable
- Outer conductor grounding - Eliminates typical grounding requirements and saves on installation costs
- Lightweight solution and compact design - Decreases tower loading
- Robust cabling - Eliminates need for expensive cable trays and ducts
- Installation of tight bundled fiber optic cable pairs directly to the RRH - Reduces CAPEX and wind load by eliminating need for interconnection
- Optical fiber and power cables housed in single corrugated cable - Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- Outdoor polyethylene jacket - Ensures long-lasting cable protection



Figure 1: HYBRIFLEX Series

Technical Specifications

CONDUCTOR			
Outer Conductor Armor	Corrugated Aluminum	[mm (in.)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in.)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
WEIGHT AND BENDING			
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in.)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in.)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
ELECTRICAL PROPERTIES			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	0.68 (0.205)
DC-Resistance Power Cable 8.4mm ² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
FIBER CABLE REQUIREMENTS			
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[μm]	50/125
Primary Coating (Acrylate)		[μm]	245
Buffer Diameter, Nominal		[μm]	900
Secondary Protection, Jacket, Nominal		[mm (in.)]	2.0 (0.08)
Minimum Bending Radius		[mm (in.)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL34-V0, UL1666 RoHS Compliant
POWER AND ALARM CABLES			
Size (Power)		[mm (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in.)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, IEC 60332-1, IEC 60332-3 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
OPERATING TEMPERATURE			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to 149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to 149)

* This data is provisional and subject to change

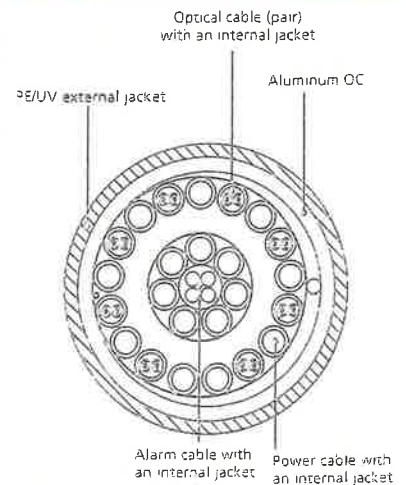


Figure 3: Construction Detail

All information contained in the present datasheet is subject to confirmation at time of ordering

ATTACHMENT 2

General		Power	Density					
Site Name: Monroe S Tower Height: Verizon @ 165ft								
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*AT&T UMTS	1	500	175	0.0059	1900	1.0000	0.59%	
*AT&T UMTS	1	500	175	0.0059	880	0.5867	1.00%	
*AT&T LTE	1	500	175	0.0059	734	0.4893	1.20%	
*AT&T GSM	1	427	175	0.0050	1900	1.0000	0.50%	
*AT&T GSM	3	296	175	0.0104	880	0.5867	1.78%	
*T-Mobile GSM	8	126	195	0.0095	1945	1.0000	0.95%	
*T-Mobile UMTS	2	589	195	0.0111	2100	1.0000	1.11%	
Verizon	15	313	165	0.0620	1970	1.0000	6.20%	
Verizon	9	336	165	0.0399	869	0.5793	6.89%	
Verizon	1	1750	165	0.0231	2145	1.0000	2.31%	
Verizon	1	788	165	0.0104	698	0.4653	2.24%	24.78%
* Source: Siting Council								

ATTACHMENT 3

Date: January 16, 2014

Mitzi Parker
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277



Crown Castle
2000 Corporate Drive
Canonsburg PA 15317
(724) 416-2000

Subject: Structural Analysis Report

Carrier Designation:	Verizon Wireless Co-Locate	
	Carrier Site Name:	Monroe South CT
Crown Castle Designation:	Crown Castle BU Number:	826053
	Crown Castle Site Name:	Monroe-1/Rt 25
	Crown Castle JDE Job Number:	255880
	Crown Castle Work Order Number:	698619
	Crown Castle Application Number:	211127 Rev. 1
Engineering Firm Designation:	Crown Castle Project Number:	698619
Site Data:	88 Main Street, Monroe, Fairfield County, CT Latitude 41° 18' 6.322", Longitude -73° 15' 2.671" 195 Foot - Monopole Tower	

Dear Mitzi Parker,

Crown Castle is pleased to submit this "Structural Analysis Report" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 698619, in accordance with application 211127, revision 1.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Existing +Proposed Equipment

Sufficient Capacity

Note: See Table I and Table II for the proposed and existing loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F standard and 2005 CT State Building Code with 2009 amendment based upon a wind speed of 85 mph fastest mile.

All equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at Crown Castle appreciate the opportunity of providing our continuing professional services to you and Crown Castle. If you have any questions or need further assistance on this or any other projects please give us a call.

Structural analysis prepared by: Truc Lac, PE / JCM

Respectfully submitted by:

Jamal A. Huwel, P.E.
Manager Engineering



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1) INTRODUCTION

This tower is a 195 ft Monopole tower designed by Summit Manufacturing LLC in May of 2001. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 60 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
165.0	165.0	3	alcatel lucent	RRH2x40-AWS	1	1-5/8	-
		3	kathrein	742 213 w/ Mount Pipe			
		1	rfs celwave	DB-B1-6C-8AB-0Z			

Table 2 - Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
195.0	195.0	6	andrew	ETW190VS12UB	25	1-5/8	2
		1	andrew	HP4-102			
		12	andrew	TMBXX-6516-R2M w/ Mount Pipe			
		1	tower mounts	Side Arm Mount [SO 901-3]			
175.0	175.0	6	ericsson	RRUS-11	12 2 1	1-5/8 7/8 3/4	1
		3	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		3	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 303-1]			
165.0	165.0	3	antel	BXA-171085-12BF w/ Mount Pipe	18	1-5/8	1
		3	antel	BXA-70063/6CF w/ Mount Pipe			
		6	antel	LPA-80080/6CF w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 403-1]			

Notes:

- 1) Existing Equipment
- 2) Existing and Future proposed loading

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
195	195	12	-	EMS RR90-17-00DP PCS	-	-
185	185	12	-	EMS RR90-17-00DP PCS	-	-
175	175	12	-	EMS RR90-17-00DP PCS	-	-
165	165	12	-	EMS RR90-17-00DP PCS	-	-
155	155	12	-	EMS RR90-17-00DP PCS	-	-
135	140	2	-	10' WHIP	-	-
115	120	2	-	10' WHIP	-	-

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Jaworski Geotech, Inc.	3488965	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	Summit Manufacturing, Inc.	1605995	CCISITES
4-TOWER MANUFACTURER DRAWINGS	Summit Manufacturing, Inc.	1606828	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- 1) Tower and structures were built in accordance with the manufacturer's specifications.
- 2) The tower and structures have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by TIA/EIA-222-F.

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	195 - 157.5	Pole	TP33.351x26x0.25	1	-7.38	1331.10	31.5	Pass
L2	157.5 - 116.75	Pole	TP40.839x32.0179x0.3125	2	-14.40	2036.66	65.6	Pass
L3	116.75 - 77	Pole	TP48.006x39.1849x0.375	3	-24.01	2874.51	75.0	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L4	77 - 38	Pole	TP54.901x46.0798x0.375	4	-35.12	3289.03	88.2	Pass
L5	38 - 0	Pole	TP61.6x52.7788x0.4375	5	-51.61	4415.35	84.1	Pass
							Summary	
						Pole (L4)	88.2	Pass
						Rating =	88.2	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	80.9	Pass
1	Base Plate	0	74.4	Pass
1	Base Foundation Soil Interaction	0	82.8	Pass

Structure Rating (max from all components) =	88.2%
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Notes:

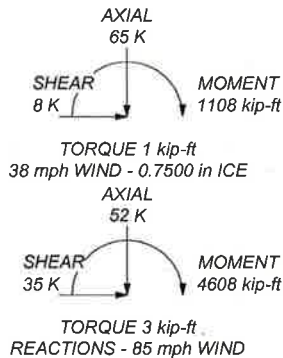
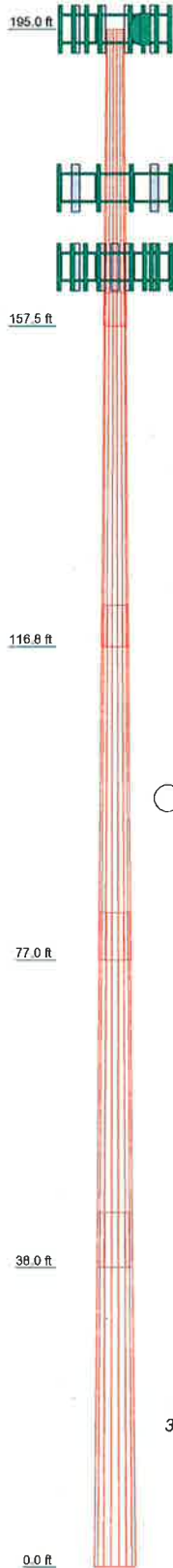
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

APPENDIX A
TNXTOWER OUTPUT

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	37.6'	18	0.2600	4.3'	26.0000	33.3510		3.0
2	45'	18	0.3125	5.3'	32.0179	40.6390	A607-65	5.5
3	45'	18	0.3750	6'	39.1849	45.0060	A607-65	7.9
4	45'	18	0.3750	7'	45.0798	54.9010	A607-65	9.1
5	45'	18	0.4375		52.7788	61.6000	A607-65	12.1



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(4) TMBXX-6516-R2M w/ Mount Pipe	195	Platform Mount [LP 303-1]	175
(2) ETW190VS12UB	195	7770.00 w/ Mount Pipe	175
(4) TMBXX-6516-R2M w/ Mount Pipe	195	BXA-70063/6CF w/ Mount Pipe	165
(2) ETW190VS12UB	195	(2) LPA-80080/6CF w/ Mount Pipe	165
(4) TMBXX-6516-R2M w/ Mount Pipe	195	742 213 w/ Mount Pipe	165
(2) ETW190VS12UB	195	RRH2x40-AWS	165
Side Arm Mount [SO 901-3]	195	BXA-171085-12BF w/ Mount Pipe	165
HP4-102	195	BXA-70063/6CF w/ Mount Pipe	165
P65-16-XLH-RR w/ Mount Pipe	175	(2) LPA-80080/6CF w/ Mount Pipe	165
(2) LGP21401	175	742 213 w/ Mount Pipe	165
DC6-48-60-18-8F	175	RRH2x40-AWS	165
(2) RRUS-11	175	BXA-171085-12BF w/ Mount Pipe	165
7770.00 w/ Mount Pipe	175	BXA-70063/6CF w/ Mount Pipe	165
P65-16-XLH-RR w/ Mount Pipe	175	(2) LPA-80080/6CF w/ Mount Pipe	165
(2) LGP21401	175	742 213 w/ Mount Pipe	165
(2) RRUS-11	175	RRH2x40-AWS	165
7770.00 w/ Mount Pipe	175	DB-B1-6C-8AB-0Z	165
P65-16-XLH-RR w/ Mount Pipe	175	Platform Mount [LP 403-1]	165
(2) LGP21401	175	BXA-171085-12BF w/ Mount Pipe	165
(2) RRUS-11	175		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice.
4. Deflections are based upon a 60 mph wind.
5. TOWER RATING: 88.2%

<p>Crown Castle 2000 Corporate Dr. Canonsburg, PA 15317 We Are Solutions Phone: (724) 413-2000 FAX:</p>	Job: BU# 879421		
	Project:		
	Client: Crown Castle	Drawn by: jmessmer	App'd:
	Code: TIA/EIA-222-F	Date: 01/15/14	Scale: NTS
	Path: R:\SA Models - Letters\Work Area\TLac\826053\826053.en		
			Dwg No. E-1

Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

- 3) Tower is located in Fairfield County, Connecticut.
- 4) Basic wind speed of 85 mph.
- 5) Nominal ice thickness of 0.7500 in.
- 6) Ice density of 56.00 pcf.
- 7) A wind speed of 38 mph is used in combination with ice.
- 8) Temperature drop of 50 °F.
- 9) Deflections calculated using a wind speed of 60 mph.
- 10) A non-linear (P-delta) analysis was used.
- 11) Pressures are calculated at each section.
- 12) Stress ratio used in pole design is 1.333.
- 13) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

- | | | |
|--|--|---|
| Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
✓ Use Code Stress Ratios
✓ Use Code Safety Factors - Guys
✓ Escalate Ice
Always Use Max Kz
Use Special Wind Profile
Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
Add IBC .6D+W Combination | Distribute Leg Loads As Uniform
Assume Legs Pinned
✓ Assume Rigid Index Plate
✓ Use Clear Spans For Wind Area
Use Clear Spans For KL/r
Retension Guys To Initial Tension
✓ Bypass Mast Stability Checks
✓ Use Azimuth Dish Coefficients
✓ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
SR Members Have Cut Ends
✓ Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Use TIA-222-G Tension Splice
Capacity Exemption | Treat Feedline Bundles As Cylinder
Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
All Leg Panels Have Same Allowable
Offset Girt At Foundation
Consider Feedline Torque
Include Angle Block Shear Check
Poles
✓ Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets |
|--|--|---|

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	195'-157'6"	37'6"	4'3"	18	26.0000	33.3510	0.2500	1.0000	A607-65 (65 ksi)
L2	157'6"-116'9"	45'	5'3"	18	32.0179	40.8390	0.3125	1.2500	A607-65 (65 ksi)
L3	116'9"-77'	45'	6'	18	39.1849	48.0060	0.3750	1.5000	A607-65 (65 ksi)
L4	77'-38'	45'	7'	18	46.0798	54.9010	0.3750	1.5000	A607-65 (65 ksi)
L5	38'-0'	45'		18	52.7788	61.6000	0.4375	1.7500	A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
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Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	26.4011	20.4326	1711.6544	9.1412	13.2080	129.5922	3425.5610	10.2183	4.1360	16.544
	33.8655	26.2656	3635.8648	11.7509	16.9423	214.6027	7276.5137	13.1353	5.4298	21.719
L2	33.3578	31.4478	3993.8666	11.2554	16.2651	245.5484	7992.9885	15.7269	5.0851	16.272
	41.4690	40.1972	8340.8765	14.3869	20.7462	402.0433	16692.728	20.1024	6.6377	21.241
L3	40.8344	46.1934	8790.2699	13.7775	19.9059	441.5909	17592.106	23.1011	6.2365	16.631
	48.7466	56.6928	16249.677	16.9090	24.3870	666.3241	32520.736	28.3518	7.7891	20.771
L4	47.9850	54.4002	14356.959	16.2252	23.4086	613.3208	28732.810	27.2053	7.4501	19.867
	55.7479	64.8996	24377.353	19.3567	27.8897	874.0627	48786.783	32.4560	9.0026	24.007
L5	54.9864	72.6825	25156.862	18.5812	26.8116	938.2813	50346.826	36.3481	8.5191	19.472
	62.5503	84.9318	40140.069	21.7127	31.2928	1282.7254	80332.955	42.4740	10.0716	23.021

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in
L1 195'-157'6"				1	1	1		
L2 157'6"-116'9"				1	1	1		
L3 116'9"-77'				1	1	1		
L4 77'-38'				1	1	1		
L5 38'-0'				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number		C _A A _A	Weight
				ft			ft ² /ft	k/ft
5/8 rod/step	C	No	CaAa (Out Of Face)	195' - 0'	1	No Ice	0.02	0.00
						1/2" Ice	0.12	0.00
						1" Ice	0.22	0.00
Safety Line 3/8	C	No	CaAa (Out Of Face)	195' - 0'	1	No Ice	0.04	0.00
						1/2" Ice	0.14	0.00
						1" Ice	0.24	0.00
LDF7-50A(1-5/8")	C	No	Inside Pole	195' - 0'	25	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF5-50A(7/8")	C	No	Inside Pole	175' - 0'	2	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF7-50A(1-5/8")	C	No	Inside Pole	175' - 0'	12	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
9776(3/4")	C	No	Inside Pole	175' - 0'	1	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
LDF7-50A(1-5/8")	C	No	Inside Pole	165' - 0'	18	No Ice	0.00	0.00
						1/2" Ice	0.00	0.00
						1" Ice	0.00	0.00
HB158-1-08U8-S8J18(1-5/8)	C	No	CaAa (Out Of Face)	165' - 0'	1	No Ice	0.20	0.00
						1/2" Ice	0.30	0.00
						1" Ice	0.40	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Sectio n	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	195'-157'6"	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.641	1.10
L2	157'6"-116'9"	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	10.412	1.95
L3	116'9"-77'	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	10.156	1.90
L4	77'-38'	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	9.964	1.87
L5	38'-0'	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	9.709	1.82

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Sectio n	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	195'-157'6"	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	16.016	1.18
L2	157'6"-116'9"	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	28.749	2.13
L3	116'9"-77'	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	28.044	2.07
L4	77'-38'	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	27.514	2.04
L5	38'-0'	A	0.750	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	26.809	1.98

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
L1	195'-157'6"	-0.1263	0.0729	-0.4609	0.2661
L2	157'6"-116'9"	-0.3064	0.1769	-0.7214	0.4165
L3	116'9"-77'	-0.3103	0.1792	-0.7476	0.4316
L4	77'-38'	-0.3131	0.1808	-0.7668	0.4427
L5	38'-0'	-0.3152	0.1820	-0.7818	0.4514

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight
			Horz	Vert					
			Lateral	ft		ft	ft ²	ft ²	K
(4) TMBXX-6516-R2M w/ Mount Pipe	A	From Leg	4.00	0.00	195'	No Ice	6.18	4.53	0.05
						1/2"	6.65	5.20	0.10
						Ice	7.14	5.90	0.16
						1" Ice			
(2) ETW190VS12UB	A	From Leg	4.00	0.00	195'	No Ice	0.76	0.35	0.01
						1/2"	0.88	0.44	0.02
						Ice	1.01	0.54	0.02
						1" Ice			
(4) TMBXX-6516-R2M w/ Mount Pipe	B	From Leg	4.00	0.00	195'	No Ice	6.18	4.53	0.05
						1/2"	6.65	5.20	0.10
						Ice	7.14	5.90	0.16
						1" Ice			
(2) ETW190VS12UB	B	From Leg	4.00	0.00	195'	No Ice	0.76	0.35	0.01
						1/2"	0.88	0.44	0.02
						Ice	1.01	0.54	0.02
						1" Ice			
(4) TMBXX-6516-R2M w/ Mount Pipe	C	From Leg	4.00	0.00	195'	No Ice	6.18	4.53	0.05
						1/2"	6.65	5.20	0.10
						Ice	7.14	5.90	0.16
						1" Ice			
(2) ETW190VS12UB	B	From Leg	4.00	0.00	195'	No Ice	0.76	0.35	0.01
						1/2"	0.88	0.44	0.02
						Ice	1.01	0.54	0.02
						1" Ice			
Side Arm Mount [SO 901-3]	C	None		0.00	195'	No Ice	1.66	1.66	0.32
						1/2"	2.17	2.17	0.33
						Ice	2.68	2.68	0.34
						1" Ice			
7770.00 w/ Mount Pipe	A	From Leg	4.00	0.00	175'	No Ice	6.12	4.25	0.06
						1/2"	6.63	5.01	0.10
						Ice	7.13	5.71	0.16
						1" Ice			
P65-16-XLH-RR w/ Mount Pipe	A	From Leg	4.00	0.00	175'	No Ice	8.64	6.36	0.08
						1/2"	9.29	7.54	0.14
						Ice	9.91	8.43	0.22
						1" Ice			
(2) LGP21401	A	From Leg	4.00	0.00	175'	No Ice	1.29	0.23	0.01
						1/2"	1.45	0.31	0.02
						Ice	1.61	0.40	0.03
						1" Ice			
DC6-48-60-18-8F	A	From Leg	4.00	0.00	175'	No Ice	1.27	1.27	0.02
						1/2"	1.46	1.46	0.04
						Ice	1.66	1.66	0.05
						1" Ice			
(2) RRUS-11	A	From Leg	4.00	0.00	175'	No Ice	3.25	1.37	0.05
						1/2"	3.49	1.55	0.07
						Ice	3.74	1.74	0.09
						1" Ice			
7770.00 w/ Mount Pipe	B	From Leg	4.00	0.00	175'	No Ice	6.12	4.25	0.06
						1/2"	6.63	5.01	0.10
						Ice	7.13	5.71	0.16
						1" Ice			
P65-16-XLH-RR w/ Mount Pipe	B	From Leg	4.00	0.00	175'	No Ice	8.64	6.36	0.08
						1/2"	9.29	7.54	0.14
						Ice	9.91	8.43	0.22
						1" Ice			
(2) LGP21401	B	From Leg	4.00	0.00	175'	No Ice	1.29	0.23	0.01
						1/2"	1.45	0.31	0.02
						Ice	1.61	0.40	0.03
						1" Ice			
(2) RRUS-11	B	From Leg	4.00	0.00	175'	No Ice	3.25	1.37	0.05
						1/2"	3.49	1.55	0.07
						Ice	3.74	1.74	0.09
						1" Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight	
			Horz Lateral	Vert						ft
7770.00 w/ Mount Pipe	C	From Leg	4.00	0'0'	0.00	175'	No Ice	6.12	4.25	0.06
							1/2"	6.63	5.01	0.10
							Ice	7.13	5.71	0.16
							1" Ice			
P65-16-XLH-RR w/ Mount Pipe	C	From Leg	4.00	0'0'	0.00	175'	No Ice	8.64	6.36	0.08
							1/2"	9.29	7.54	0.14
							Ice	9.91	8.43	0.22
							1" Ice			
(2) LGP21401	C	From Leg	4.00	0'0'	0.00	175'	No Ice	1.29	0.23	0.01
							1/2"	1.45	0.31	0.02
							Ice	1.61	0.40	0.03
							1" Ice			
(2) RRUS-11	C	From Leg	4.00	0'0'	0.00	175'	No Ice	3.25	1.37	0.05
							1/2"	3.49	1.55	0.07
							Ice	3.74	1.74	0.09
							1" Ice			
Platform Mount [LP 303-1]	C	None			0.00	175'	No Ice	14.66	14.66	1.25
							1/2"	18.87	18.87	1.48
							Ice	23.08	23.08	1.71
							1" Ice			
* BXA-171085-12BF w/ Mount Pipe	A	From Leg	4.00	0'0'	0.00	165'	No Ice	4.97	5.23	0.04
							1/2"	5.52	6.39	0.09
							Ice	6.04	7.26	0.14
							1" Ice			
BXA-70063/6CF w/ Mount Pipe	A	From Leg	4.00	0'0'	0.00	165'	No Ice	7.98	5.70	0.04
							1/2"	8.62	6.85	0.10
							Ice	9.23	7.71	0.17
							1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	A	From Leg	4.00	0'0'	0.00	165'	No Ice	4.56	10.73	0.05
							1/2"	5.11	11.99	0.11
							Ice	5.61	12.97	0.19
							1" Ice			
742 213 w/ Mount Pipe	A	From Leg	4.00	0'0'	0.00	165'	No Ice	5.37	4.62	0.05
							1/2"	5.95	6.00	0.09
							Ice	6.50	6.98	0.15
							1" Ice			
RRH2x40-AWS	A	From Leg	4.00	0'0'	0.00	165'	No Ice	2.52	1.59	0.04
							1/2"	2.75	1.80	0.06
							Ice	2.99	2.01	0.08
							1" Ice			
BXA-171085-12BF w/ Mount Pipe	B	From Leg	4.00	0'0'	0.00	165'	No Ice	4.97	5.23	0.04
							1/2"	5.52	6.39	0.09
							Ice	6.04	7.26	0.14
							1" Ice			
BXA-70063/6CF w/ Mount Pipe	B	From Leg	4.00	0'0'	0.00	165'	No Ice	7.98	5.70	0.04
							1/2"	8.62	6.85	0.10
							Ice	9.23	7.71	0.17
							1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	B	From Leg	4.00	0'0'	0.00	165'	No Ice	4.56	10.73	0.05
							1/2"	5.11	11.99	0.11
							Ice	5.61	12.97	0.19
							1" Ice			
742 213 w/ Mount Pipe	B	From Leg	4.00	0'0'	0.00	165'	No Ice	5.37	4.62	0.05
							1/2"	5.95	6.00	0.09
							Ice	6.50	6.98	0.15
							1" Ice			
RRH2x40-AWS	B	From Leg	4.00	0'0'	0.00	165'	No Ice	2.52	1.59	0.04
							1/2"	2.75	1.80	0.06
							Ice	2.99	2.01	0.08
							1" Ice			
BXA-171085-12BF w/ Mount Pipe	C	From Leg	4.00	0'0'	0.00	165'	No Ice	4.97	5.23	0.04
							1/2"	5.52	6.39	0.09
							Ice	6.04	7.26	0.14
							1" Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight	
			Horz Lateral	Vert						
			ft	ft	ft	ft ²	ft ²	K		
BXA-70063/6CF w/ Mount Pipe	C	From Leg	4.00	0'	0.00	165'	No Ice	7.98	5.70	0.04
							1/2" Ice	8.62	6.85	0.10
							Ice	9.23	7.71	0.17
							1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.00	0'	0.00	165'	No Ice	4.56	10.73	0.05
							1/2" Ice	5.11	11.99	0.11
							Ice	5.61	12.97	0.19
							1" Ice			
742 213 w/ Mount Pipe	A	From Leg	4.00	0'	0.00	165'	No Ice	5.37	4.62	0.05
							1/2" Ice	5.95	6.00	0.09
							Ice	6.50	6.98	0.15
							1" Ice			
RRH2x40-AWS	A	From Leg	4.00	0'	0.00	165'	No Ice	2.52	1.59	0.04
							1/2" Ice	2.75	1.80	0.06
							Ice	2.99	2.01	0.08
							1" Ice			
DB-B1-6C-8AB-0Z	A	From Leg	4.00	0'	0.00	165'	No Ice	5.60	2.33	0.04
							1/2" Ice	5.92	2.56	0.08
							Ice	6.24	2.79	0.12
							1" Ice			
Platform Mount [LP 403-1]	C	None			0.00	165'	No Ice	18.85	18.85	1.50
							1/2" Ice	24.30	24.30	1.80
							Ice	29.75	29.75	2.09
							1" Ice			

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				Horz Lateral	Vert							
			ft	ft	ft	ft	ft	ft ²	K			
HP4-102	B	Paraboloid w/Shroud (HP)	From Leg	1.00	0'	0.00		195'	4.00	No Ice	12.57	0.08
										1/2" Ice	13.09	0.15
										1" Ice	13.61	0.21

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp

Comb. No.	Description
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	195 - 157.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-14.25	-1.46	2.07
			Max. Mx	11	-7.42	268.68	11.04
			Max. My	2	-7.42	14.93	263.10
			Max. Vy	11	-17.67	268.68	11.04
			Max. Vx	2	-17.71	14.93	263.10
			Max. Torque	6			3.80
			Max Tension	1	0.00	0.00	0.00
L2	157.5 - 116.75	Pole	Max. Compression	14	-22.74	-1.17	1.92
			Max. Mx	11	-14.44	1058.60	25.22
			Max. My	2	-14.44	35.39	1054.49
			Max. Vy	11	-22.11	1058.60	25.22
			Max. Vx	2	-22.15	35.39	1054.49
			Max. Torque	6			3.80
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-33.80	-0.80	1.70
L3	116.75 - 77	Pole	Max. Mx	11	-24.04	2009.43	39.18
			Max. My	2	-24.04	55.68	2006.73
			Max. Vy	11	-26.57	2009.43	39.18
			Max. Vx	2	-26.61	55.68	2006.73
			Max. Torque	6			3.68
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-46.32	-0.38	1.46
			Max. Mx	11	-35.13	3096.33	52.61
L4	77 - 38	Pole	Max. My	2	-35.13	75.34	3095.02
			Max. Vy	11	-30.47	3096.33	52.61
			Max. Vx	2	-30.51	75.34	3095.02
			Max. Torque	6			3.56
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-64.68	0.18	1.14
			Max. Mx	11	-51.62	4558.48	68.02
			Max. My	2	-51.62	98.01	4558.79
L5	38 - 0	Pole	Max. Vy	11	-34.40	4558.48	68.02
			Max. Vx	2	-34.45	98.01	4558.79
			Max. Torque	6			3.44

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	64.68	4.11	7.03
	Max. H _x	11	51.63	34.38	0.34
	Max. H _z	2	51.63	0.49	34.42
	Max. M _x	2	4558.79	0.49	34.42
	Max. M _z	5	4525.98	-34.21	-0.29
	Max. Torsion	6	3.33	-29.72	-17.35
	Min. Vert	1	51.63	0.00	0.00
	Min. H _x	5	51.63	-34.21	-0.29
	Min. H _z	8	51.63	-0.33	-34.38
	Min. M _x	8	-4549.94	-0.33	-34.38
	Min. M _z	11	-4558.48	34.38	0.34
	Min. Torsion	12	-3.33	29.86	17.43

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	51.63	0.00	0.00	-0.66	-0.22	0.00
Dead+Wind 0 deg - No Ice	51.63	-0.49	-34.42	-4558.79	98.01	1.75
Dead+Wind 30 deg - No Ice	51.63	17.01	-29.64	-3915.03	-2244.38	0.65
Dead+Wind 60 deg - No Ice	51.63	29.62	-16.90	-2218.43	-3918.22	-1.19
Dead+Wind 90 deg - No Ice	51.63	34.21	0.29	56.52	-4525.98	-2.71
Dead+Wind 120 deg - No Ice	51.63	29.72	17.35	2305.28	-3937.83	-3.33
Dead+Wind 150 deg - No Ice	51.63	17.35	29.81	3946.42	-2312.56	-3.06
Dead+Wind 180 deg - No Ice	51.63	0.33	34.38	4549.94	-66.83	-2.14
Dead+Wind 210 deg - No Ice	51.63	-16.89	29.71	3928.15	2218.70	-0.65
Dead+Wind 240 deg - No Ice	51.63	-29.73	16.79	2193.34	3939.99	1.58
Dead+Wind 270 deg - No Ice	51.63	-34.38	-0.34	-68.02	4558.48	2.93
Dead+Wind 300 deg - No Ice	51.63	-29.86	-17.43	-2322.94	3965.57	3.33
Dead+Wind 330 deg - No Ice	51.63	-17.48	-29.92	-3971.32	2337.36	2.84
Dead+Ice+Temp	64.68	0.00	-0.00	-1.14	0.18	0.00
Dead+Wind 0 deg+Ice+Temp	64.68	-0.10	-8.09	-1097.81	20.24	0.30
Dead+Wind 30 deg+Ice+Temp	64.68	4.02	-6.98	-944.22	-542.80	0.05
Dead+Wind 60 deg+Ice+Temp	64.68	6.99	-3.99	-537.15	-946.10	-0.33
Dead+Wind 90 deg+Ice+Temp	64.68	8.07	0.06	10.14	-1092.43	-0.63
Dead+Wind 120 deg+Ice+Temp	64.68	7.00	4.07	552.10	-949.56	-0.72
Dead+Wind 150 deg+Ice+Temp	64.68	4.08	7.01	947.97	-556.00	-0.62
Dead+Wind 180 deg+Ice+Temp	64.68	0.06	8.09	1093.73	-13.24	-0.38
Dead+Wind 210 deg+Ice+Temp	64.68	-3.99	6.99	944.80	537.75	-0.05
Dead+Wind 240 deg+Ice+Temp	64.68	-7.01	3.96	529.63	951.12	0.42
Dead+Wind 270 deg+Ice+Temp	64.68	-8.10	-0.07	-14.79	1099.74	0.67
Dead+Wind 300 deg+Ice+Temp	64.68	-7.03	-4.09	-558.07	955.86	0.72
Dead+Wind 330 deg+Ice+Temp	64.68	-4.11	-7.03	-955.48	561.67	0.57
Dead+Wind 0 deg - Service	51.63	-0.24	-17.15	-2274.45	48.78	0.88
Dead+Wind 30 deg - Service	51.63	8.48	-14.77	-1953.25	-1119.67	0.33
Dead+Wind 60 deg - Service	51.63	14.76	-8.42	-1106.94	-1954.61	-0.60
Dead+Wind 90 deg - Service	51.63	17.05	0.14	27.84	-2257.81	-1.36
Dead+Wind 120 deg - Service	51.63	14.81	8.64	1149.60	-1964.48	-1.68

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Service						
Dead+Wind 150 deg - Service	51.63	8.65	14.85	1968.27	-1153.74	-1.54
Dead+Wind 180 deg - Service	51.63	0.17	17.13	2269.29	-33.49	-1.08
Dead+Wind 210 deg - Service	51.63	-8.41	14.80	1959.08	1106.60	-0.33
Dead+Wind 240 deg - Service	51.63	-14.81	8.36	1093.70	1965.23	0.79
Dead+Wind 270 deg - Service	51.63	-17.13	-0.17	-34.31	2273.81	1.47
Dead+Wind 300 deg - Service	51.63	-14.88	-8.68	-1159.17	1978.10	1.67
Dead+Wind 330 deg - Service	51.63	-8.71	-14.91	-1981.46	1165.88	1.43

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-51.63	0.00	0.00	51.63	0.00	0.000%
2	-0.49	-51.63	-34.42	0.49	51.63	34.42	0.000%
3	17.01	-51.63	-29.64	-17.01	51.63	29.64	0.000%
4	29.62	-51.63	-16.90	-29.62	51.63	16.90	0.000%
5	34.21	-51.63	0.29	-34.21	51.63	-0.29	0.000%
6	29.72	-51.63	17.35	-29.72	51.63	-17.35	0.000%
7	17.35	-51.63	29.81	-17.35	51.63	-29.81	0.000%
8	0.33	-51.63	34.38	-0.33	51.63	-34.38	0.000%
9	-16.89	-51.63	29.71	16.89	51.63	-29.71	0.000%
10	-29.73	-51.63	16.79	29.73	51.63	-16.79	0.000%
11	-34.38	-51.63	-0.34	34.38	51.63	0.34	0.000%
12	-29.86	-51.63	-17.43	29.86	51.63	17.43	0.000%
13	-17.48	-51.63	-29.92	17.48	51.63	29.92	0.000%
14	0.00	-64.68	0.00	-0.00	64.68	0.00	0.000%
15	-0.10	-64.68	-8.09	0.10	64.68	8.09	0.000%
16	4.02	-64.68	-6.98	-4.02	64.68	6.98	0.000%
17	6.99	-64.68	-3.99	-6.99	64.68	3.99	0.000%
18	8.07	-64.68	0.06	-8.07	64.68	-0.06	0.000%
19	7.00	-64.68	4.07	-7.00	64.68	-4.07	0.000%
20	4.08	-64.68	7.01	-4.08	64.68	-7.01	0.000%
21	0.06	-64.68	8.09	-0.06	64.68	-8.09	0.000%
22	-3.99	-64.68	6.99	3.99	64.68	-6.99	0.000%
23	-7.01	-64.68	3.96	7.01	64.68	-3.96	0.000%
24	-8.10	-64.68	-0.07	8.10	64.68	0.07	0.000%
25	-7.03	-64.68	-4.09	7.03	64.68	4.09	0.000%
26	-4.11	-64.68	-7.03	4.11	64.68	7.03	0.000%
27	-0.24	-51.63	-17.15	0.24	51.63	17.15	0.000%
28	8.48	-51.63	-14.77	-8.48	51.63	14.77	0.000%
29	14.76	-51.63	-8.42	-14.76	51.63	8.42	0.000%
30	17.05	-51.63	0.14	-17.05	51.63	-0.14	0.000%
31	14.81	-51.63	8.64	-14.81	51.63	-8.64	0.000%
32	8.65	-51.63	14.85	-8.65	51.63	-14.85	0.000%
33	0.17	-51.63	17.13	-0.17	51.63	-17.13	0.000%
34	-8.41	-51.63	14.80	8.41	51.63	-14.80	0.000%
35	-14.81	-51.63	8.36	14.81	51.63	-8.36	0.000%
36	-17.13	-51.63	-0.17	17.13	51.63	0.17	0.000%
37	-14.88	-51.63	-8.68	14.88	51.63	8.68	0.000%
38	-8.71	-51.63	-14.91	8.71	51.63	14.91	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.0000001	0.0000001
2	Yes	4	0.0000001	0.00061184
3	Yes	6	0.0000001	0.00004810
4	Yes	6	0.0000001	0.00004793
5	Yes	4	0.0000001	0.00086486
6	Yes	6	0.0000001	0.00004676
7	Yes	6	0.0000001	0.00005145
8	Yes	5	0.0000001	0.00012077
9	Yes	6	0.0000001	0.00004652
10	Yes	6	0.0000001	0.00004587
11	Yes	5	0.0000001	0.00013699
12	Yes	6	0.0000001	0.00005216
13	Yes	6	0.0000001	0.00004799
14	Yes	4	0.0000001	0.00000634
15	Yes	5	0.0000001	0.00020482
16	Yes	5	0.0000001	0.00025195
17	Yes	5	0.0000001	0.00025145
18	Yes	5	0.0000001	0.00020407
19	Yes	5	0.0000001	0.00025300
20	Yes	5	0.0000001	0.00025826
21	Yes	5	0.0000001	0.00020342
22	Yes	5	0.0000001	0.00024762
23	Yes	5	0.0000001	0.00024655
24	Yes	5	0.0000001	0.00020551
25	Yes	5	0.0000001	0.00026186
26	Yes	5	0.0000001	0.00025780
27	Yes	4	0.0000001	0.00023912
28	Yes	5	0.0000001	0.00023363
29	Yes	5	0.0000001	0.00023197
30	Yes	4	0.0000001	0.00047218
31	Yes	5	0.0000001	0.00022495
32	Yes	5	0.0000001	0.00025992
33	Yes	4	0.0000001	0.00076766
34	Yes	5	0.0000001	0.00022114
35	Yes	5	0.0000001	0.00021627
36	Yes	4	0.0000001	0.00089218
37	Yes	5	0.0000001	0.00026598
38	Yes	5	0.0000001	0.00023528

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	195 - 157.5	66.43	38	2.87	0.01
L2	161.75 - 116.75	46.85	38	2.70	0.01
L3	122 - 77	26.60	38	2.09	0.00
L4	83 - 38	12.13	38	1.41	0.00
L5	45 - 0	3.52	38	0.71	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
195'	HP4-102	38	66.43	2.87	0.01	36033
175'	7770.00 w/ Mount Pipe	38	54.49	2.80	0.01	9007
165'	BXA-171085-12BF w/ Mount Pipe	38	48.69	2.73	0.01	6006

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	195 - 157.5	132.84	13	5.75	0.02
L2	161.75 - 116.75	93.73	13	5.40	0.02
L3	122 - 77	53.25	13	4.18	0.01
L4	83 - 38	24.30	13	2.82	0.00
L5	45 - 0	7.05	13	1.42	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
195'	HP4-102	13	132.84	5.75	0.02	18313
175'	7770.00 w/ Mount Pipe	13	109.00	5.60	0.02	4576
165'	BXA-171085-12BF w/ Mount Pipe	13	97.41	5.46	0.02	3049

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
L1	195 - 157.5 (1)	TP33.351x26x0.25	37'6"	0'	0.0	39.00	25.6046	-7.38	998.58	0.007
L2	157.5 - 116.75 (2)	TP40.839x32.0179x0.3125	45'	0'	0.0	39.00	39.1765	-14.40	1527.88	0.009
L3	116.75 - 77 (3)	TP48.006x39.1849x0.375	45'	0'	0.0	39.00	55.2929	-24.01	2156.42	0.011
L4	77 - 38 (4)	TP54.901x46.0798x0.375	45'	0'	0.0	39.00	63.2663	-35.12	2467.39	0.014
L5	38 - 0 (5)	TP61.6x52.7788x0.4375	45'	0'	0.0	39.00	84.9318	-51.61	3312.34	0.016

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} F _{by}
L1	195 - 157.5 (1)	TP33.351x26x0.25	272.83	16.06	39.00	0.412	0.00	0.00	39.00	0.000
L2	157.5 - 116.75 (2)	TP40.839x32.0179x0.3125	1073.2	33.73	39.00	0.865	0.00	0.00	39.00	0.000
L3	116.75 - 77 (3)	TP48.006x39.1849x0.375	2035.4	38.54	39.00	0.988	0.00	0.00	39.00	0.000
L4	77 - 38 (4)	TP54.901x46.0798x0.375	3133.2	45.27	39.00	1.161	0.00	0.00	39.00	0.000
L5	38 - 0 (5)	TP61.6x52.7788x0.4375	4608.1	43.11	39.00	1.105	0.00	0.00	39.00	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	195 - 157.5 (1)	TP33.351x26x0.25	17.87	0.70	26.00	0.054	3.80	0.11	26.00	0.004
L2	157.5 - 116.75 (2)	TP40.839x32.0179x0.312 5	22.41	0.57	26.00	0.044	3.26	0.05	26.00	0.002
L3	116.75 - 77 (3)	TP48.006x39.1849x0.375	26.86	0.49	26.00	0.037	3.12	0.03	26.00	0.001
L4	77 - 38 (4)	TP54.901x46.0798x0.375	30.76	0.49	26.00	0.037	2.99	0.02	26.00	0.001
L5	38 - 0 (5)	TP61.6x52.7788x0.4375	34.68	0.41	26.00	0.031	2.84	0.01	26.00	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P	Ratio f_{bx}	Ratio f_{by}	Ratio f_v	Ratio f_{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		P_a	F_{bx}	F_{by}	F_v	F_{vt}			
L1	195 - 157.5 (1)	0.007	0.412	0.000	0.054	0.004	0.420 ✓	1.333	H1-3+VT ✓
L2	157.5 - 116.75 (2)	0.009	0.865	0.000	0.044	0.002	0.875 ✓	1.333	H1-3+VT ✓
L3	116.75 - 77 (3)	0.011	0.988	0.000	0.037	0.001	1.000 ✓	1.333	H1-3+VT ✓
L4	77 - 38 (4)	0.014	1.161	0.000	0.037	0.001	1.176 ✓	1.333	H1-3+VT ✓
L5	38 - 0 (5)	0.016	1.105	0.000	0.031	0.000	1.121 ✓	1.333	H1-3+VT ✓

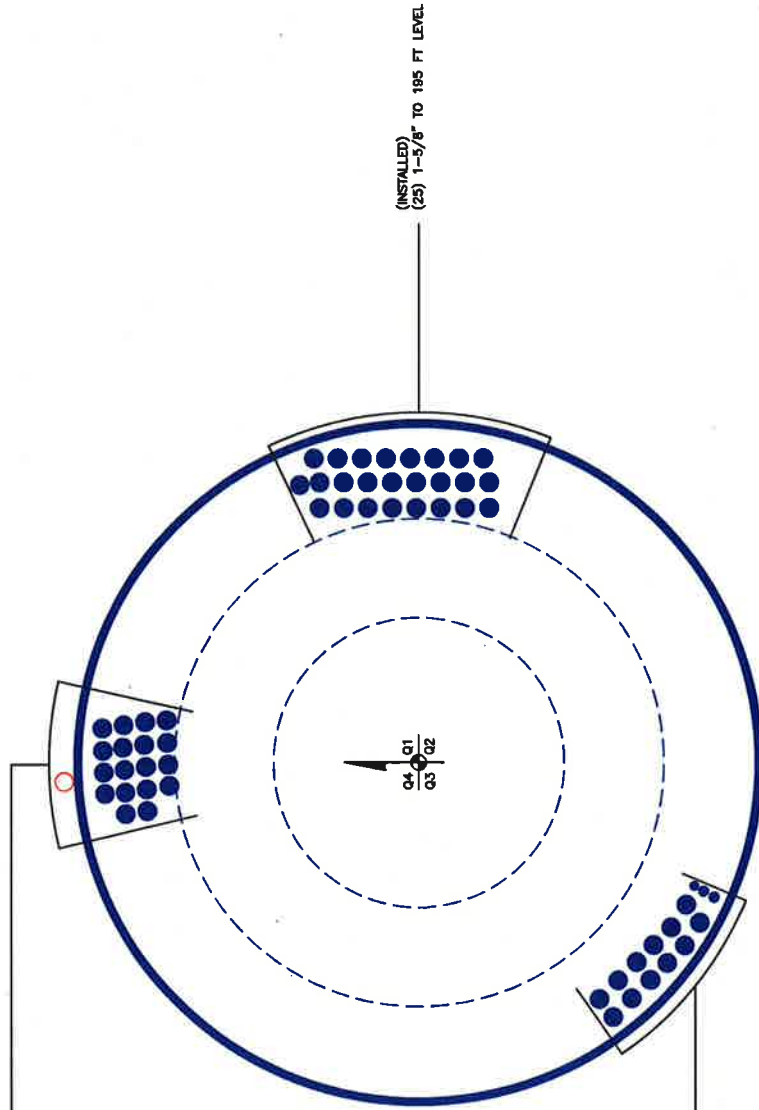
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF \cdot P_{allow}$ K	% Capacity	Pass Fail
L1	195 - 157.5	Pole	TP33.351x26x0.25	1	-7.38	1331.10	31.5	Pass
L2	157.5 - 116.75	Pole	TP40.839x32.0179x0.3125	2	-14.40	2036.66	65.6	Pass
L3	116.75 - 77	Pole	TP48.006x39.1849x0.375	3	-24.01	2874.51	75.0	Pass
L4	77 - 38	Pole	TP54.901x46.0798x0.375	4	-35.12	3289.03	88.2	Pass
L5	38 - 0	Pole	TP61.6x52.7788x0.4375	5	-51.61	4415.35	84.1	Pass
Summary								
Pole (L4)							88.2	Pass
RATING =							88.2	Pass

APPENDIX B
BASE LEVEL DRAWING



(PROPOSED)
(1) 1-5/8" TO 165 FT LEVEL
(INSTALLED)
(18) 1-5/8" TO 165 FT LEVEL



(INSTALLED)
(25) 1-5/8" TO 185 FT LEVEL

(INSTALLED)
(1) 3/4" TO 175 FT LEVEL
(2) 7/8" TO 175 FT LEVEL
(12) 1-5/8" TO 175 FT LEVEL

APPENDIX C
ADDITIONAL CALCULATIONS

Square, Stiffened / Unstiffened Base Plate, Any Rod Material - Rev. F / G

- Assumptions:**
- 1) Rod groups at corners. Total # rods divisible by 4. Maximum total # of rods = 48 (12 per Corner).
 - 2) Rod Spacing = Straight Center-to-Center distance between any (2) adjacent rods (same corner)
 - 3) Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#:	826053	
Site Name:	Monroe-1/Rt 25	
App #:	211127 Rev. 1	
Anchor Rod Data		
Qty:	20	
Diam:	2.25	in
Rod Material:	A615-J	
Yield, Fy:	75	ksi
Strength, Fu:	100	ksi
Bolt Circle:	69	in
Anchor Spacing:	6	in

Plate Data

W=Side:	68	in
Thick:	3	in
Grade:	55	ksi
Clip Distance:	0	in

Stiffener Data (Welding at both sides)

Configuration:	Unstiffened	
Weld Type:		**
Groove Depth:		in **
Groove Angle:		degrees
Fillet H. Weld:		<-- Disregard
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data

Diam:	61.6	in
Thick:	0.4375	in
Grade:	65	ksi
# of Sides:	18	*0" IF Round

Stress Increase Factor

ASD ASIF:	1.333	
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** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Base Reactions

TIA Revision:	F	
Unfactored Moment, M:	4608	ft-kips
Unfactored Axial, P:	52	kips
Unfactored Shear, V:	35	kips

Anchor Rod Results

TIA F → Maximum Rod Tension	157.7 Kips
Allowable Tension:	195.0 Kips
Anchor Rod Stress Ratio:	80.9% Pass

Base Plate Results

Base Plate Stress:	40.9 ksi	Flexural Check
Allowable PL Bending Stress:	55.0 ksi	
Base Plate Stress Ratio:	74.4% Pass	

PL Ref. Data

Yield Line (in):	34.57
Max PL Length:	34.57

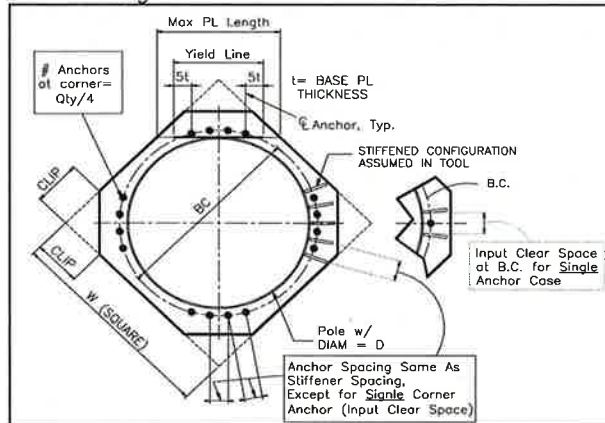
N/A - Unstiffened

Stiffener Results

Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, $f_b/F_b + (f_v/F_v)^2$:	N/A
Plate Tension+Shear, $f_t/F_t + (f_v/F_v)^2$:	N/A
Plate Comp. (AISC Bracket):	N/A

Pole Results

Pole Punching Shear Check:	N/A
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BU:	826053
Site Name:	Monroe-1/Rt 25
App Number:	211127 Rev. 1
Work Order:	698619

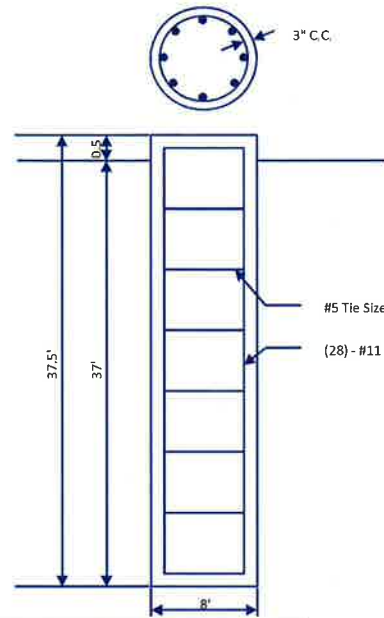


Monopole Drilled Pier

Input

Criteria	
TIA Revision:	F
ACI 318 Revision:	2002
Seismic Category:	B
Forces	
Compression	52 kips
Shear	35 kips
Moment	4608 k-ft
Swelling Force	0 kips
Foundation Dimensions	
Pier Diameter:	8 ft
Ext. above grade:	0.5 ft
Depth below grade:	37 ft
Material Properties	
Number of Rebar:	28
Rebar Size:	11
Tie Size	5
Rebar tensile strength:	60 ksi
Concrete Strength:	3000 psi
Ultimate Concrete Strain	0.003 in/in
Clear Cover to Ties:	3 in

Soil Profile: 1



Layer	Thickness (ft)	From (ft)	To (ft)	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)	Ultimate Uplift Skin Friction (ksf)	Ultimate Comp. Skin Friction (ksf)	Ultimate Bearing Capacity (ksf)	SPT 'N' Counts
1	3	0	3	120	0	0	0	0	0	
2	10	3	13	57.6	0	0	0	0	0	
3	24	13	37	52.6	0	34	1.5	1.5	30	

Analysis Results

Soil Lateral Capacity	
Depth to Zero Shear:	14.37 ft
Max Moment, Mu:	5106.86 k-ft
Soil Safety Factor:	3.33
Safety Factor Req'd:	2
RATING:	60.0%
Soil Axial Capacity	
Skin Friction (k):	452.39 kips
End Bearing (k):	753.98 kips
Comp. Capacity (k), φCn:	1206.37 kips
Comp. (k), Cu:	52.00 kips
RATING:	4.3%

Concrete/Steel Check	
Mu (from soil analysis)	6638.92 k-ft
φMn	8014.75 k-ft
RATING:	82.8%
rho provided	0.60
rho required	0.33 OK
Rebar Spacing	8.39
Spacing required	22.56 OK
Dev. Length required	22.38
Dev. Length provided	61.78 OK

Overall Foundation Rating: 82.8%